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Economical Smart Agriculture Monitoring System

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Abstract: ***In recent times, where technology is playing major role in all the aspects of our life ,farming which is majorly affected by various environmental fators need enhanced ways in order to improve the yeild of crops. In this paper we have discussed the use of IoT technology to help the farmers detect the favourable envornmental conditions such as temperature, humidity, soil moisture and water level with the help of various sensor implemntation . The system will compare the information collected from hardware module with the standard information stored for each seed in database and provide details of the seeds that will be appropriate to be cultivated under the environmental conditions that are obtained from the wireless sensors. Nowadays, the emerging Internet of Things (IoT) along with Wireless Sensor Networks (WSNs) with their low-cost sensors and new opportunities provide a more precise, site-specific, and sustainable agriculture in the context of Smart Farming.***

KEYWORDS: IoT, sensors, Wireless Sensor Networks

I. INTRODUCTION

Agriculture forms the the basis of livelihood for the major rural population of India. It also play an important role in providing large scale employment to the people. Agricultural development palys a vital rôle in affecting the economy of our country. Almost all the farmers are still depending on the traditional orthodox way of farming. It is being observe that the yield of crops, fruits have been hampered by the change in the weather conditions. In In today automated world humans have been replaced by machines that is science and technology has proved its importance in the fields. Therefore there is need to grab the fruitfulness of science and technology in the field for higher yield and growth in agriculture. Most of the papers signifies the use of wireless sensors network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in turn helps to monitor the system. Climate change affects crop product and hinders agricultural growth . National governments and corporate sectors can provide coordinated approaches to climate change, integrated risk management, agricultural and food security policies.Following are the major factors that encouraged the development of this project.

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An efficient interface for management of IT infrastructure is essential to any organization's growth and is often part of their business strategy as well. Solution must be easy to use, secure and it should improve performance of the overall system.

A naive user should feel comfortable using the system and an administrator or a super-user must have necessary privileges to achieve organizational objectives without compromising on security or productivity. The existing solutions are more command-line oriented with little to no regard for a Graphical User Interface (GUI) making such solutions difficult to use. Hence, developing a GUI is necessary.The rate of adoption of centralization is set to increase in the near-future. Hence, the target audience for such a management solution will also increase. Management tools for infrastructure are often not economically viable for SMEs.Hence, a new perspective towards the cost model is necessary. The man objective of the paper includes developing a system for precision irrigation using sensor network mainly aimed for monitoring soil, moisture and estimating environment changes by considering soil moisture, soil temperature and relative humidity as parameters for measurement. .The system uses distributed wireless sensor network to detect the environmental changes. System was to develop a low cost wireless controlled Agriculture system. It aims at making agriculture smart using automation and IOT. The Objective of the system were to provide precision agriculture and irrigation .

II. PROPOSED METHODOLOGY

The Agriculture Monitoring And Seed Germination Suggestion is designed to help farmers to analyse an agriculture environment and suggest seed name that will be appropriate for the detected environmental conditions. The system deals with general agriculture challenges, such as humidity, soil moisture and waterlevel. and the extreme variations in seasonal temperatures. By Analysing all the challenges mentioned above the system will compare the information collected from hardware module with the information stored for each seed in database and suggest that this soil is **s**uitable to grow which which type of seed efficiently. The search ability helps to enter the name of seed and system will give detect if it is possible to grow **t**his seed or not under the entered environmental conditions and if result is in negation then the system suggest name of seed which is suitable to be gron.. The system is a combination of hardware and software components. The hardware part consists of Arduino nano, temperature sensor, soil sensor, humidity sensor, moisture sensor and WiFi module and software is the web based designed using HTML, CSS, JavaScript, AngularJS, PHP, MySQL And Embedded C++.

The webpage is hosted online and consists of a database in which readings from sensors are inserted using the hardware. The WiFi module is primary responsible for transmitting the data obtained from sensors to server. The system uses information from soil to irrigate soil which helps to prevent over irrigation or under irrigation of soil. The farm owner can monitor the process online through a website.

III. OVERVIEW OF MODULES AND SUBSYSTEM

In the field, various sensors are deployed like temperature, humidity, soil, water sensor. The data is collected from these sensors which are connected to the Arduino nano. The received data is verified with the threshold values. if the data exceeds the threshold value the LED starts to blink.This alarm is sent as a message to the farmer and automatically the power off after sensing. The values are generated in the web page and the farmer gets the detailed description of the value. The user has to switch ON and OFF the Arduino nano by pressing the button in the Arduino Application developed. The Arduino Nano gets switched ON and OFF automatically if the value exceeds the threshold point. Soon after the Arduino nano is started automatically an alert must be sent to the user. This is achieved by sending a message through the Wi-Fi module. Other parameter like the temperature, humidity, soil, water sensor show threshold value and it is used just to indicate the value of all sensors.

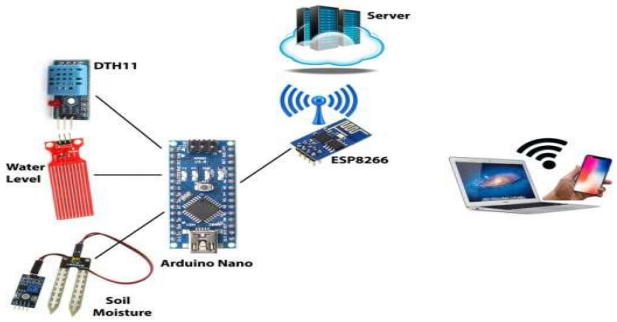

Fig.1.1 Working of System

A. Arduino (Arduino Nano)

When Arduino is an open-source prototyp1ing platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - a sensor, a finger on a button, and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino Software (IDE) based on programming language named Processing. Which also supports the languages C and C++. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT(Internet of Things) applications, wearable, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing.

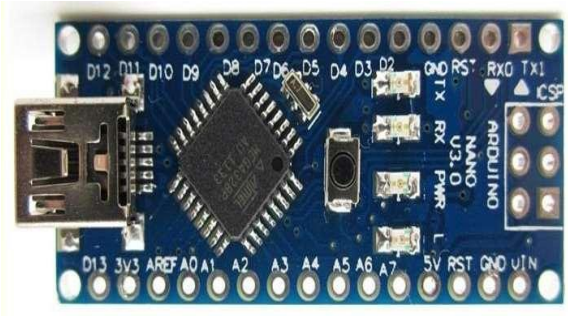

Fig 1.2 Arduino Nano

B. Soil Moisture Sensor (FC-28)

Soil is an important natural resource, just as the air and water that surround us are. Unfortunately it has been overlooked in the past and taken for granted with disastrous results, Today, the role of soil health on our climate as a whole is taken more seriously. In order for any soil probe to work, no matter the type, it must make contact with the soil. The most accurate soil probe will be fully surrounded by the soil, with no gaps or air holes between the probe and the soil. The probe then sends electrical signals into the soil, measures the responses, and relays this information to a data collection device known as a data logger.

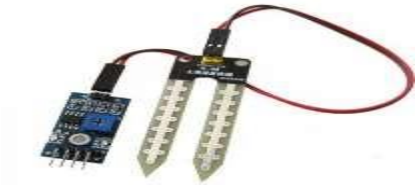

Fig.1.3 Soil Moisture Sensor

C. Temperature Sensor (DTH11)

Temperature Sensors measure the amount of heat energy or even coldness that is generated by anobject or system, allowing us to SENSE or detect any physic change to that temperatureproducing either an analogue or digital output.

Fig.1.4 Temperature Sensor

D. Humidity Sensor (DTH22)

The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative ”Humidity” .Humidity Sensors are very important devices that help in measuring the environmental humidity. Technically, the device used to measure the humidity of the atmosphere is called Hygrometer. Humidity Sensors or Hygrometers can be classified based on the type of humidity it is used for measuring. There are other types of Humidity Sensors or Hygrometers like Optical Hygrometer, Oscillating Hygrometer and Gravimetric Hygrometer.

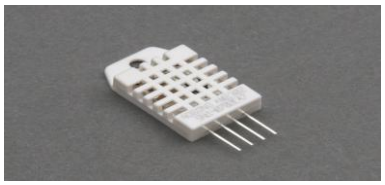

Fig.1.5. Humidity Sensor

E. Water Level Sensor (RKI-2350)

Level sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries, granular material and powders. Level measurements can be done using containers or it can be the level of a river or lake. Such measurements can be used to determine the amount of materials within a closed container or the flow of water in open channels.

Fig.1.6. Water Level Sensor

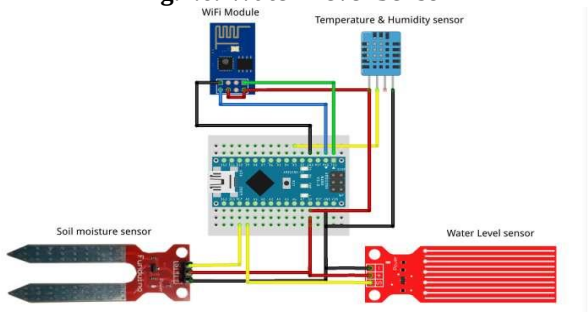

Fig.1.7. Circuit Diagram

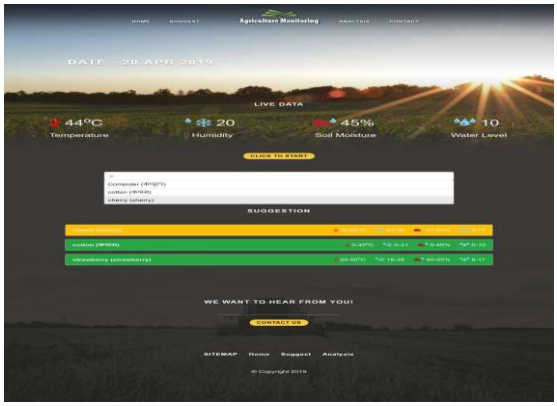

Fig.18. Seed Suggestion Page

Agricultural Monitoring system has been implemented to increase the yield of crops by monitoring the environmental conditions (parameters). In this system that is developed by using various sensors , input is provided by the different sensors and depending on the saved database , the system manipulates and specifies if the condition of the soil and other factors are favorable for the growth of the plants or not

IV. CONCLUSION

Agricultural Monitoring system is implemented to provide the farmers information about the soil, water , and humidity of th field. This system is mainly developed for the betterment of farmers. The use of wireless sensor network over the wired one helps for deploying it in any type of environment for monitoring, making it flexible and robust. The use of IoT and different sensors element facilitates the system for re-reconfigurability and re-programmability according to different environmental conditions. We have developed module that suggest seed prevalent for the soil and temperature conditions. It provides real time monitoring to farmers.

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